CHAPTER 3

INTERPRETING OUTCOME REPORTS

A. INTRODUCTION

In the first steps of the outcome analysis phase of OBQI (collecting uniform data), an agency establishes processes to collect and transmit clean, high-quality patient data for use in computing outcomes. Most agencies institute several changes necessary to ensure the success of this data collection effort. The conclusion of the first phase of OBQI involves the analysis of data and the production of several types of agency-level (aggregate) reports. These reports allow the agency to move to OBQI's second phase, which includes the use of outcome data in continuous quality improvement (CQI) activities.

This chapter focuses on interpreting the OBQI reports available to agencies. The outcome report (including both risk-adjusted and descriptive outcomes) is the primary report discussed here. The case mix report and the adverse event outcome report are discussed in more detail in the manual *Quality Monitoring Using Case Mix and Adverse Event Outcome Reports*, which is available on the OASIS Web site at http://www.hcfa.gov/medicaid/oasis/hhtrain.htm. The patient tally report and its use in outcome enhancement (the second phase of OBQI) are described in Chapter 5.

B. DATA ANALYSIS

Although data analysis experts and statisticians conduct analyses of OASIS data for outcome computations, a brief overview of the process is helpful in understanding outcome reports. Recalling the definition of a patient outcome as a change in health status between two time points is important in interpreting the reports.

Data processing procedures match each patient's OASIS data from start (or resumption) of care to the data for the same patient at transfer (to an inpatient facility) or discharge time points and then compute outcomes based on change in status. Individual patient-level outcome data are then aggregated to the agency level and compared to a reference sample.

Case mix variables that describe patient attributes or circumstances likely to impact health status (such as a patient's environmental or living conditions, demographics, and baseline health status data) are also computed. Individual patient-level case mix information is aggregated to the agency level to describe the health status of all the agency's patients at start or resumption of care. Case mix measures also are compared to a reference sample so that significant

differences between agency's patients and the reference sample of patients are identified.

These differences between the agency's patients and the reference group are taken into account in additional analyses to "risk adjust" many of the outcomes in an individual agency's outcome report. **Risk adjustment** is a statistical technique that minimizes differences between groups of patients when making comparisons. For instance, if the average age of an agency's patients is 88 years, and the average age of patients in the reference sample is 72, the age difference alone might explain why the agency's outcomes are different than the reference group outcomes. To make valid outcome comparisons between a given agency and the reference sample, it is necessary to put all outcome information on a "level playing field." Thus, risk adjustment will statistically "factor out" (or account for) differences in an agency's patients vs. the reference sample. Risk adjustment minimizes the possibility that differences in outcomes between comparison groups are due to factors other than the care provided by the agency. Section E of this chapter discusses risk adjustment in additional detail.

C. REPORTS PRODUCED FROM OASIS DATA

As noted in Chapter 2, multiple types of OASIS-based reports are available for each agency's patient sample. Currently, the four reports available include: an outcome report (containing risk-adjusted and descriptive outcomes), an adverse event outcome report, a case mix report (to accompany each type of outcome report), and a patient tally report. The risk-adjusted and descriptive outcome report, the accompanying case mix report, and the patient tally report are the primary reports utilized in OBQI, while the adverse event outcome report and its accompanying case mix report are useful in an agency's quality monitoring program. The remainder of this chapter will focus on the use of the principal OBQI report (i.e., the risk-adjusted and descriptive outcome report). The patient tally report and its use in OBQI are discussed in Chapter 5.

D. REVIEWING AND INTERPRETING THE RISK-ADJUSTED AND DESCRIPTIVE OUTCOME REPORTS

A sample outcome report is presented in this section in Figure 3.1. Key concepts are discussed here to aid in understanding the reports.

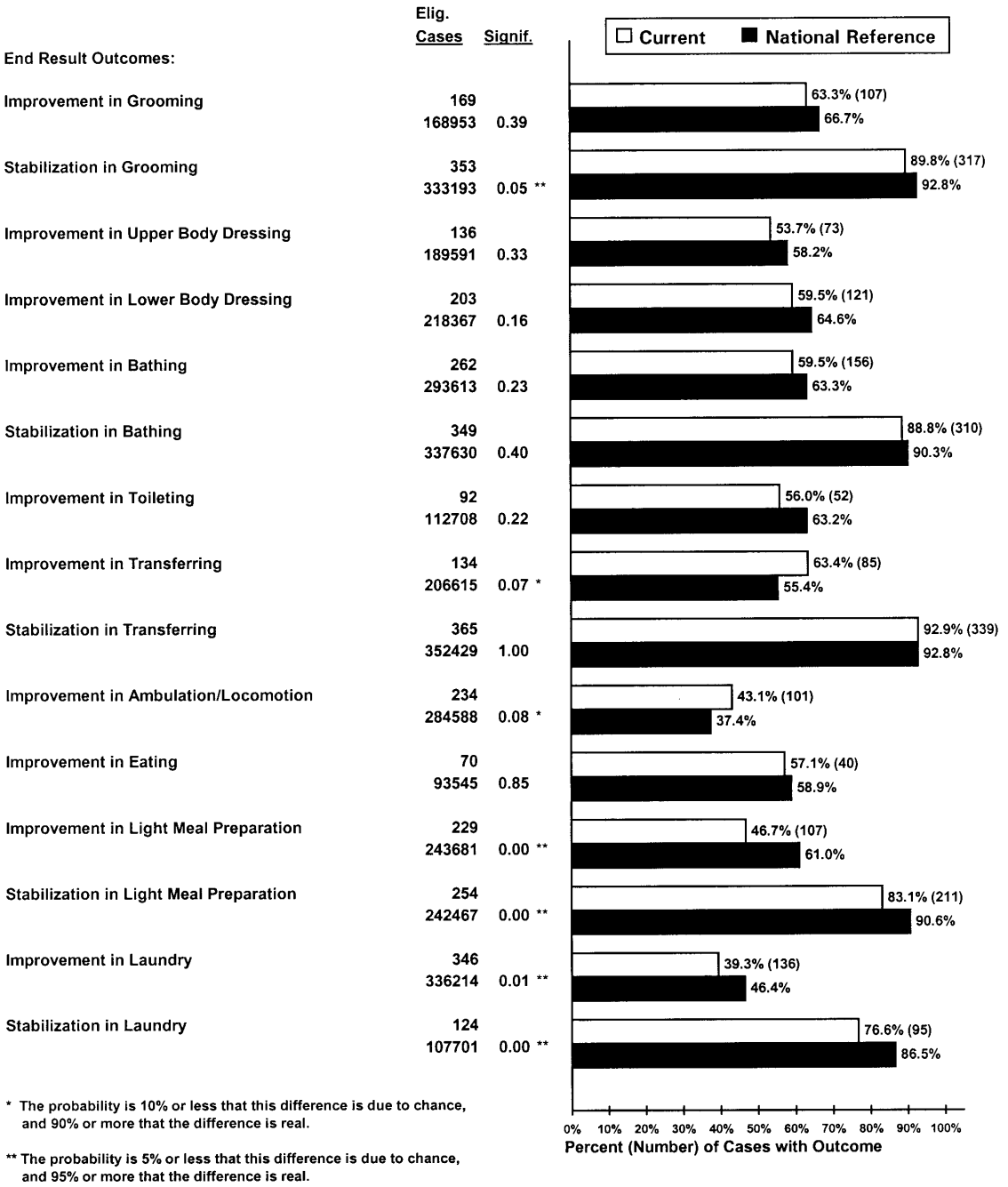
The episodes of care represented in these reports are the same as all other reports based on OASIS data. Each episode of care must have a beginning (i.e., a SOC or ROC assessment) and a conclusion (i.e., a transfer or discharge

FIGURE 3.1: Sample All Patients' Outcome Report (Risk Adjusted).

Agency Name: FAIRCARE HOME HEALTH SERVICES
Agency ID: HHA01
Location: ANYTOWN, USA
Medicare Number: 007001
Medicaid Number: 999888001

Requested Current Period: 01/2001 - 12/2001
Actual Current Period: 01/2001 - 12/2001
Number of Cases in Current Period: 374
Number of Cases in Natl Ref Sample: 357978
Date Report Printed: 02/28/2002

All Patients' Risk Adjusted Outcome Report



* The probability is 10% or less that this difference is due to chance, and 90% or more that the difference is real.

** The probability is 5% or less that this difference is due to chance, and 95% or more that the difference is real.

assessment) to be considered a complete case. A patient who is admitted to your agency, then is transferred to an inpatient facility WITHOUT discharge, then resumes care, and is subsequently discharged, is represented as two episodes of care. One episode goes from start of care to transfer to inpatient facility, while the second goes from resumption of care to discharge. This episode of care is not the same as a payment episode under PPS.

The report heading at the top indicates the dates of the report period (by month) and the number of cases (i.e., episodes) included for both the agency and the reference sample. The report period is one year, ending with the month specified by your agency when requesting the reports. The number of your agency's cases includes all patients with complete episodes of care (defined as having a SOC/ROC assessment matched with a transfer/discharge assessment) during the 12-month report period. The reference cases -- the patients to whom your patients are being compared -- are composed of a random sample of all patients served by home health agencies that are subject to the OASIS reporting requirement, subject to data quality screening criteria.

Two Sections of the Outcome Report

The outcomes in the report are presented in two sections, the **risk-adjusted outcomes** followed by the **descriptive outcomes**. Twenty-nine outcomes are displayed in the risk-adjusted section of the report, while twelve outcomes appear in the descriptive section. Titles at the top of each page indicate which section of the report is being reviewed.

Each of the risk-adjusted outcomes has a unique statistical risk model that considers differences in the agency's patient population as compared to the reference group. The descriptive outcomes have not yet been risk-adjusted, though this is planned for future reports. (The process of risk adjustment is described in additional detail in Section E and Attachment C to this chapter.)

Each outcome measure has a separate **bar graph** that indicates the percentage of cases where the outcome was achieved. In your first outcome report, two bars are presented, corresponding to the "current" and "reference" cases. In addition to the percentage of "current" cases, the actual number of agency cases where the outcome was achieved are presented in parentheses at the end of the corresponding bar.

Types of Outcome Measures Included

Each section of the report includes two main categories (or types) of outcome measures. The first page(s) of each report section includes **end-result outcomes**, which are a variety of health status outcomes. The report includes physiologic, functional, cognitive, and emotional status end-result outcomes. The

last page of each report depicts **utilization outcomes**. The utilization outcomes relate to use of health care services resulting from a change in patient health status. Occasionally these outcomes are described as proxies for significant change in health status.

Utilization outcomes are computed for the entire sample of cases. That is, all the agency's Medicare and Medicaid case episodes enter into the computation for these outcomes, since all had the potential to receive emergent care, to be hospitalized, or to be discharged to the community.

End-result outcomes, however, are only computed for those cases that were not transferred to an inpatient facility. This is why the sample size(s) for the end-result outcomes displayed in the outcome report typically are smaller than the sample size(s) for the utilization outcomes.

Definitions of "Improvement" and "Stabilization"

The end-result outcomes are of two types: **improvement** outcome measures and **stabilization** outcome measures. It is important to understand the definitions of each type of measure.

A patient improves in a specific outcome when the scale value for the health attribute under consideration shows an improvement in patient condition when the two time points are compared. If the patient is less disabled or dependent at discharge than at start (or resumption) of care, then the patient has improved.

A patient stabilizes in a specific outcome when the scale value for the health attribute under consideration shows nonworsening in patient condition when the two time points are compared. If the patient is no more disabled/dependent (that is, has not worsened) at discharge than at start (or resumption) of care, then the patient has stabilized.

For example, a patient who was disabled in transferring (according to OASIS item M0690) at start of care and became less disabled (but not necessarily totally independent) at discharge has improved in transferring. If the patient did not worsen, then he/she has stabilized. Thus, the opposite of stabilization is a patient who declines.

The actual outcome measures that correspond to improvement or stabilization simply quantify the above concepts. Consider again the measure for improvement in transferring. The OASIS transferring scale used for data collection takes on values between 0 and 5, with higher values indicating progressively more disability/dependence. A patient whose value on this scale at start (or resumption) of care is 2, and whose value at discharge is 1, has improved in transferring. Likewise, the patient whose value on this same scale at start (or resumption) of

care is 3, and whose value at discharge is 0, also has improved in transferring. When you aggregate all your agency's cases' transferring results, you determine in what percentage of cases the transferring ability improved. The remainder stayed the same or got worse.

A similar computation occurs for the measure of stabilization in transferring. Recall the definition of stabilization as nonworsening. A patient stabilizes in transferring if, from start (or resumption) of care to discharge, the value on the transferring scale moves toward 0 (reflecting improvement) or remains the same. The patient whose value on the transferring scale at start (or resumption) of care is 3, and whose value at discharge is also 3, thus has stabilized in transferring. When an agency aggregates all its patients' transferring stabilization results, the result is the percentage of cases that stabilized in transferring. The remainder worsened.

It should be noted that stabilization rates typically are higher than improvement rates. This is due to the fact that improvement rates only include those cases where patients actually improve, while stabilization rates include both cases where patients improve and those where patients stay the same (i.e., did not worsen).

Some patients are excluded from the improvement or the stabilization computations. Any patient whose status at start (or resumption) of care is optimal for the health attribute under consideration is excluded from the improvement computation. Such a case is excluded because the patient could not possibly show improvement, since he/she is as "good" as they can possibly be for this attribute. All the patients included in the improvement computation had the potential to show improvement; the percentage (and the actual number of cases) listed at the end of the bar actually did improve.

Similar to exclusions from the improvement measures, some cases are excluded from the stabilization computation. Any patient whose status at start (or resumption) of care is at the most severely impaired level for the health attribute under consideration is excluded from the stabilization computation. This patient could not possibly show worsening, so is excluded.

The improvement and the stabilization outcome measures are computed separately. That is, all the agency's care episodes are first considered for a single improvement measure, those at the most independent level of the scale are excluded, and then the improvement measure is computed. The excluded care episodes are returned to the analysis group, so that all the agency's cases are likewise considered for a single stabilization measure. Those at the most dependent level of the scale are excluded, and the stabilization measure is computed.

Cases can be excluded from one improvement measure but included in another—due to different abilities being reflected on the specific OASIS data items. This is why the number of cases listed on the outcome report varies from measure to measure. However, the number of cases listed for a specific measure will never be higher than the total number of cases included in the report.

Statistical Significance

Statistical significance is relevant when outcomes are compared between sets of patients (for example, "current" vs. "reference" samples). The **statistical significance** of the comparison merely expresses the probability that any outcome difference computed between the two sets of patients would have occurred if the two groups were really the same in terms of outcomes. It may be easier to understand if you consider statistical significance the probability (measured in percentages) that the difference in outcomes between the agency "current" column and the "reference" column is due to chance. If the significance is greater than .10, then we consider the probability high that the difference was due to chance. Thus, your energy and attention should not be focused on those outcomes. Conversely, you should look very closely at outcomes with a significance of .10 or less, since the probability that the difference between the "current" outcome and the "reference" outcome is due to chance is quite low.

In Appendix A of this manual you will find the *Guidelines for Reviewing the Outcome, Case Mix, and Patient Tally Reports.* These guidelines are important to increase your understanding of the various report components. You also are strongly advised to reproduce these guidelines and to share them with any individual or groups who review your reports.

E. RISK ADJUSTMENT

Some emphasis has been placed on the fact that most of the outcomes have been "risk-adjusted." What precisely does this mean?

Assume that an agency's outcomes are inferior to those of the national reference sample. Why might that be? One explanation, of course, is that the agency's outcomes truly are inferior. A second (alternative) explanation is that the agency's patients are at greater risk for poor outcomes. To determine which of these explanations is true requires risk adjusting each agency's outcomes.

Risk adjustment statistically "factors out" (or accounts for) differences in one agency's patients vs. the reference sample. Risk adjustment minimizes the possibility that differences in outcomes between comparison groups are due to factors other than the care provided by the agency.

Multivariate modeling using various logistic regression techniques is the most common approach to statistical risk adjustment. This essentially entails developing a predictive formula for a specific outcome using a reference group of patients. The predictive formula (or model) expresses an outcome measure in terms of risk factors. The predictive model is applied to obtain a predicted outcome for each of the agency's patients. These are summed (i.e., aggregated, totaled) to determine an agency-level expected outcome rate, which is then compared to the agency's actual outcome to determine whether care was superior or inferior relative to the reference sample. In this way, the patient characteristics and risk factors most closely associated with specific outcome measures are taken into account. We at least minimize (if not totally remove) the explanation that outcome differences are due to the presence of an individual agency's patients being at greater "risk" for poor outcomes. Table 3.1 lists the steps followed in risk adjusting the outcome measures.

TABLE 3.1: Steps in Risk Adjustment.

1. Determine the relationship between a given outcome measure and those patient-level attributes (risk factors) that influence the outcome. A total of 149 patient-level attributes are available from OASIS items and are eligible for consideration as risk factors.

2. Based on the relationships determined in Step 1, calculate predicted outcome values for each case/patient in the agency.

3. Aggregate individual case/patient predicted outcome values to determine an agency-level expected rate for the outcome.

4. Determine the agency's actual (observed) outcome rate and compare it to the expected rate.

5. Display the observed rate as the agency's "current" rate for the outcome and the expected rate as the "reference" rate.

It is important to recognize that each outcome measure has its own risk model. That is, the risk model for the outcome of Acute Care Hospitalization is developed separately from the risk model for the Improvement in Grooming measure. All OASIS items are used in developing the risk models. Some items are used in many models, while others may be used in only a few. Models are re-estimated (re-validated, re-done) each time outcome reports are produced, meaning that the current characteristics of the reference sample are always considered.

Because each agency's expected outcome rate is computed for its own patients, the agency-level expected outcome rate will vary from agency to agency. Remember that this rate is what is displayed as the "reference" value on an agency's outcome report. Therefore, Agency A's "national reference" value is likely to differ from Agency B's "national reference" value on the same outcome appearing in the risk-adjusted report, due to the difference in Agency A's patient case mix compared to Agency B's patient case mix. (In contrast, the "reference" value for the outcomes displayed in the descriptive report will be constant from one agency to another, due to the fact that this value represents the average, or mean, outcome rate across all agencies.)

Attachment C to this chapter provides additional detail on risk adjustment for those with more interest in the multivariate statistical approach. Because the risk models for each outcome are developed and validated separately with each round of analysis, the models are not included here.

F. DATA SHOCK

Agency staff often are unprepared for the emotional reaction they experience upon first encountering reports of this nature. It is likely to be the first time that staff sees the results of their care provision displayed in terms of patient outcomes. It is likely that some outcomes will fall above the reference averages, some will fall below, and some will not be statistically different from the norms. It may be quite unsettling to see an outcome that is significantly worse than the reference sample, since staff correctly respond to this as actual care that was delivered to actual patients. Their first reaction when reviewing the report may be defensiveness or denial. Some of the comments agency staff may express when receiving an outcome report for the first time are, "There is no way that this report reflects our care...we have an excellent staff, so this must be a problem with the OBQI system," or "The reason that our reports look the way they do is that the contract staff didn't understand the data collection." Another reaction that staff sometimes experience when seeing an outcome report is a tendency to "explain" outcome results by emphasizing the fact that the agency's patients are unique compared to the reference sample; that is, staff members may forget that case mix differences have been "factored out" in the risk adjustment process.

With the receipt of the first outcome report, there also is a strong tendency to blame the data. "I know that our staff is not consistent in responding to that OASIS data item, so obviously our patient outcomes can't be validly compared to others" is an example of a reaction that blames the data. In investigating care provision, such inconsistencies may be found, but we encourage agencies to look more deeply into the actual patient care that was provided.

It will be important for those leading the quality improvement efforts in the agency to try to move themselves and others past these immediate reactions and into the investigation of care processes that may have led to the outcomes. Staff may need a reminder that most of the report has been adjusted statistically for risk factor differences between the agency's patients and the reference sample of patients. Reinforcement about the integration of OASIS items into the assessment forms and the training that was conducted with staff to facilitate the collection of clean, high-quality data may be required. Failure to move past these emotional reactions can slow down or halt the outcome enhancement process, thus jeopardizing the opportunity to take an in-depth look at the clinical actions that could have influenced the outcomes and the chance to improve patient care (or reinforce excellent care behaviors).

G. PRESENTING THE OUTCOME REPORT TO STAFF

Once the outcome reports are available, agency staff is likely to be extremely interested in the report contents. Clinicians obviously have every intention of providing high quality care to their patients, and they typically are interested in seeing concrete evidence of their success in these efforts. At the same time, they may have concerns that their care sometimes has fallen short of their own expectations, and they wonder whether these perceived "deficiencies" are revealed in the reports.

Many agencies find that presenting outcome reports to staff is challenging, both from an emotional perspective and from the perspective of explaining a large amount of information in a concise, clear manner. It requires the explanation of new concepts and definitions and the ongoing reinforcement of the principles of a data-driven system of outcome measurement. Keep in mind that staff may be very unsettled when first presented with the outcome report, particularly with any outcomes that are unfavorable to the reference sample. It will be important to clearly explain the format of the report and definitions of key terms. It is also helpful to ensure that they understand the composition of the reference sample as the cumulative data from the national data repository. Staff will probably need to be reminded that differences between the agency's cases and the reference sample are taken into account in the analysis of data, since staff tend to try to "explain away" differences in outcomes due to the uniqueness of the agency's patients (e.g., "our patients come home much sicker than any other agencies' patients").

It is important to present reports not as a "report card," but as an opportunity to identify areas of patient care that can be improved or that are superior to the reference sample. Select a small set of outcomes to introduce to staff if the entire outcome report will be overwhelming. If an agency has a "mixed report" (i.e., some outcomes that are superior to the reference sample and some that are

worse), present at least one outcome of each type. Some agencies choose to delay the report's presentation to staff until after a smaller group has already identified specific outcomes to target for the quality improvement activities. If this is true, staff should be given the reasoning behind the decision to delay the presentation of the outcome report.

When outcome reports are discussed with the staff, keep the presentation short, simple, and clear. Use of overheads or handouts may help clarify points. The most important things to remember when planning presentations are to be patient with staff as they grapple with these new concepts and to continuously remind them of the importance of their role as innovators with outcome measurement in home health care. (Additional content on training staff in understanding outcome reports is found in Chapter 9 of this manual.)

H. REPORT CONFIDENTIALITY

The outcome and patient tally reports are produced for the internal use of Medicare-certified home health agencies and for use by State agencies for defined business purposes. The primary purpose of the reports is to improve the quality of care in agencies. The reports do not meet privacy requirements and are not releasable to the public. As a reminder, a confidentiality disclaimer is printed on the last page of each report section. The Centers for Medicare & Medicaid Services (CMS) is in the process of creating reports that can be released to the public. These public reports are expected to be available in the near future.

The patient tally reports, produced for agency use from OASIS data, also are expected to remain confidential. The tally reports contain identifiable patient names, thus assuring their confidentiality is required by the Conditions of Participation for certified home health agencies (and for all others required to meet the Conditions of Participation). The tally reports contain a confidentiality disclaimer on each report page.

I. SUMMARY

It will be gratifying to see the results of the data collection effort for the outcome analysis phase of OBQI implementation. Outcome reports will generate many reactions from all the individuals and groups reviewing them, including excitement, defensiveness, and confusion. In order to achieve the best results from the outcome enhancement activities, be prepared to move quickly past the initial reactions to the report and on to the steps in outcome enhancement, the quality improvement aspects of OBQI. These steps are addressed in the next sections of this manual.

FREQUENTLY ASKED QUESTIONS

1. Why is there a difference in the number of cases listed in the upper right corner of the reports than the number reported for each individual outcome?

The "Number of Cases in Current Period" in the upper right corner of the reports lists all the cases that were available for calculating the end result or utilization outcomes. In contrast, the number of cases listed for each outcome is the number of patients that might have achieved that outcome. For example: In the outcome reports for Faircare Home Health Services, there were 169 (out of the total of 374 cases) who could have shown improvement in grooming (i.e., were not fully independent at start or resumption of care) for Faircare's current period. By subtraction, this means that 205 patients (374 - 169 = 205) were fully independent in grooming at start or resumption of care; these patients were excluded from the computation of the improvement outcome measure.

2. How can the same patient be counted for both the "improved" and the "stabilized" outcomes?

A single patient is included in any outcome for which he/she meets the inclusion criteria. On the report, each outcome shows the aggregated results (for all of the agency's patients) for that particular outcome. For each outcome, you are looking at the percentage of the agency's patients that achieved that unique outcome. Stabilization outcomes include patients that improve and patients that stay the same (i.e., do not worsen). Remember that stabilization means "nonworsening."

3. On all reports, what agencies make up the "reference" group? The "number of cases in the national reference sample" in the example isn't large enough number to be the total number of patients from all the agencies reporting data across the country.

A nationally representative random sample, drawn from all the Medicare-certified agencies that have submitted data for their Medicare/Medicaid patients, makes up the reference group. The sample is limited only by deleting agencies or patients that do not pass edit checks (i.e., where data quality issues are present). Because the sample is randomly selected, cases are distributed throughout the year, and each CMS region is represented.

FREQUENTLY ASKED QUESTIONS

4. Why do you use resumption of care information in the outcome and case mix reports? Resumption of care is not the start of an episode.

For outcome reporting, we refer to care episodes, not payment episodes. Because the status of the patient, the patient's care needs, and the care provided often change after an inpatient stay, the care episode from start of care to transfer is considered separately from the care episode after the patient's return to care after an inpatient stay.

5. I really have trouble understanding "statistical significance." Where does that number come from? What does it really mean?

Significance testing evaluates the probability that the difference in outcomes between the agency and the reference value is chance fluctuation. Statistical methods are used to assess this probability. It may help to consider the statistical significance as a percentage. For example, look at the outcome of Improvement in Upper Body Dressing on the report in Figure 3.1. In this report, 53.7% of the agency's current patients and the 58.2% of the reference group's patients who could have improved in dressing upper body actually did show improvement. The statistical significance shows that there is a .33 (33%) probability that the difference between the agency and the reference is due to chance, or only a 67% probability that the difference actually exists (i.e., the agency's outcomes are perceived as no different than those of the reference).

FREQUENTLY ASKED QUESTIONS

6. I don't understand the meaning of risk adjustment. How is this actually done?

The basic purpose of risk adjustment is to ensure a fair comparison of outcomes by taking into consideration patient characteristics at the start of a home care episode that may affect the likelihood of specific outcomes during this episode. A predicted value for a specific outcome is computed based on an analysis of the relationships between that outcome and its multiple risk factors in the reference group of patients. A formula then is developed that expresses the probability of the outcome as a mathematical function of the most relevant risk factors. Using this formula for each of a specific agency's patients, the expected value for the agency's rate on a specific outcome measure can be estimated. The actual outcome rate achieved by the agency (its current value) then is compared to the expected value (the reference value on the report).

The potential risk factors used in this process are derived from OASIS data items. A total of 149 risk factors are considered as candidates for inclusion in each outcome measure's risk model. The specific risk factors actually used in risk adjusting an individual outcome are selected from this group of potential factors based on clinical meaningfulness and importance as well as statistical effectiveness. Therefore, the number and type of risk factors included in risk adjustment models differ from outcome to outcome.

7. How could we respond to hostile agency staff members who react negatively to the information on the outcome report?

Rather than retroactively trying to diffuse anger and hostility after presenting the entire report to staff, focus on proactive education and advance preparation to increase the likelihood that most will understand the meaning of the report when it is presented. In a large agency, it may be best to provide the preparatory education to selected staff members, including key supervisory and management personnel as well as strong "peer leaders." If those key people develop a good understanding of the contents, they can help to determine the information to be presented later to all staff and the methods of presentation. They are also likely to reinforce the education of others.

ATTACHMENT A TO CHAPTER 3

ILLUSTRATIVE OUTCOME REPORT FOR FAIRCARE HOME HEALTH SERVICES

Agency Name: FAIRCARE HOME HEALTH SERVICES
Agency ID: HHA01
Location: ANYTOWN, USA
Medicare Number: 007001
Medicaid Number: 999888001

Requested Current Period: 01/2001 - 12/2001
Actual Current Period: 01/2001 - 12/2001
Number of Cases in Current Period: 374
Number of Cases in Natl Ref Sample: 357978
Date Report Printed: 02/28/2002

All Patients' Risk Adjusted Outcome Report

End Result Outcomes:	Elig. Cases	Signif.	Current	National Reference
Improvement in Grooming	169		63.3% (107)	
	168953	0.39		66.7%
Stabilization in Grooming	353		89.8% (317)	
	333193	0.05 **		92.8%
Improvement in Upper Body Dressing	136		53.7% (73)	
	189591	0.33		58.2%
Improvement in Lower Body Dressing	203		59.5% (121)	
	218367	0.16		64.6%
Improvement in Bathing	262		59.5% (156)	
	293613	0.23		63.3%
Stabilization in Bathing	349		88.8% (310)	
	337630	0.40		90.3%
Improvement in Toileting	92		56.0% (52)	
	112708	0.22		63.2%
Improvement in Transferring	134		63.4% (85)	
	206615	0.07 *		55.4%
Stabilization in Transferring	365		92.9% (339)	
	352429	1.00		92.8%
Improvement in Ambulation/Locomotion	234		43.1% (101)	
	284588	0.08 *		37.4%
Improvement in Eating	70		57.1% (40)	
	93545	0.85		58.9%
Improvement in Light Meal Preparation	229		46.7% (107)	
	243681	0.00 **		61.0%
Stabilization in Light Meal Preparation	254		83.1% (211)	
	242467	0.00 **		90.6%
Improvement in Laundry	346		39.3% (136)	
	336214	0.01 **		46.4%
Stabilization in Laundry	124		76.6% (95)	
	107701	0.00 **		86.5%

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
Percent (Number) of Cases with Outcome

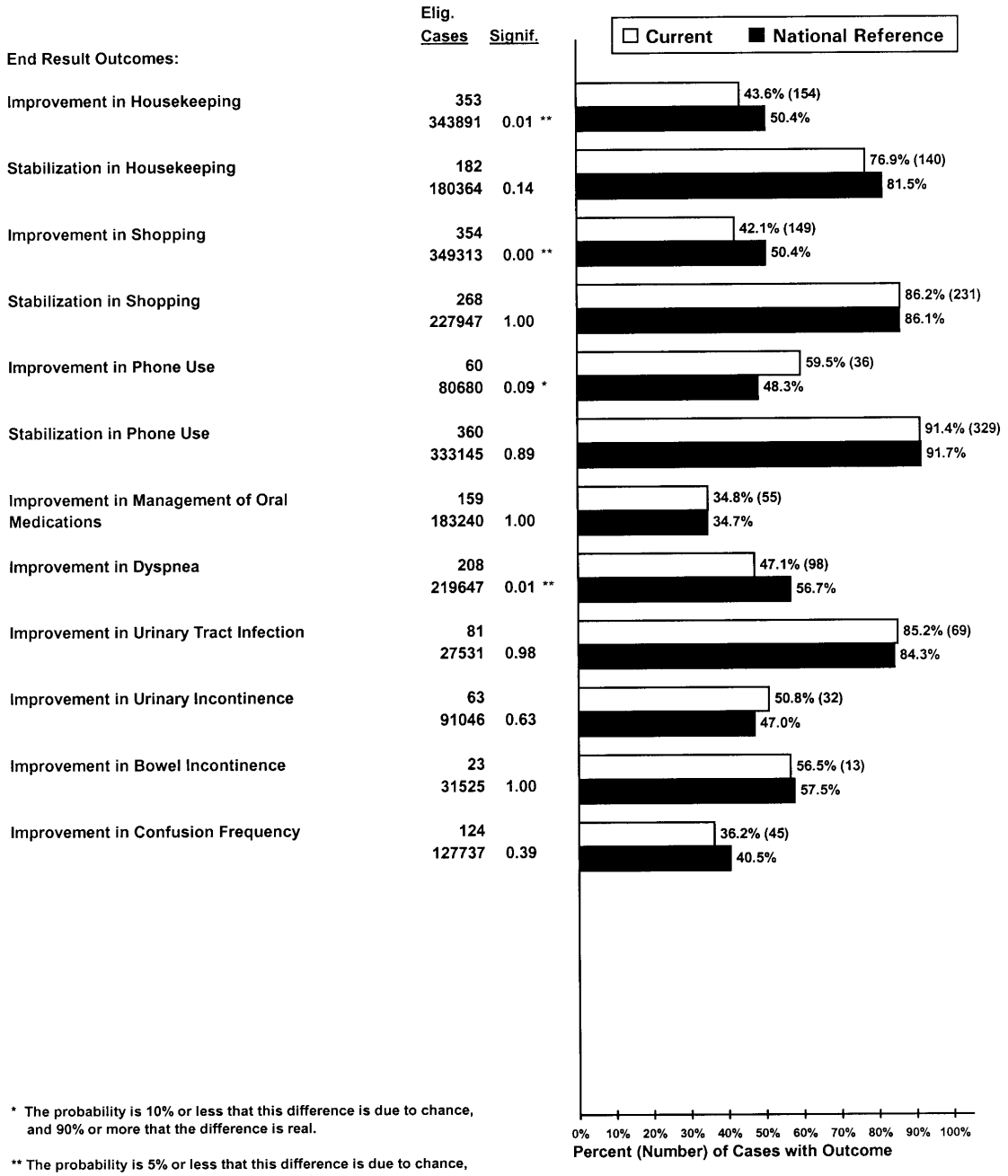
* The probability is 10% or less that this difference is due to chance, and 90% or more that the difference is real.

** The probability is 5% or less that this difference is due to chance, and 95% or more that the difference is real.

Agency Name: FAIRCARE HOME HEALTH SERVICES
Agency ID: HHA01
Location: ANYTOWN, USA
Medicare Number: 007001
Medicaid Number: 999888001

Requested Current Period: 01/2001 - 12/2001
Actual Current Period: 01/2001 - 12/2001
Number of Cases in Current Period: 374
Number of Cases in Natl Ref Sample: 357978
Date Report Printed: 02/28/2002

All Patients' Risk Adjusted Outcome Report



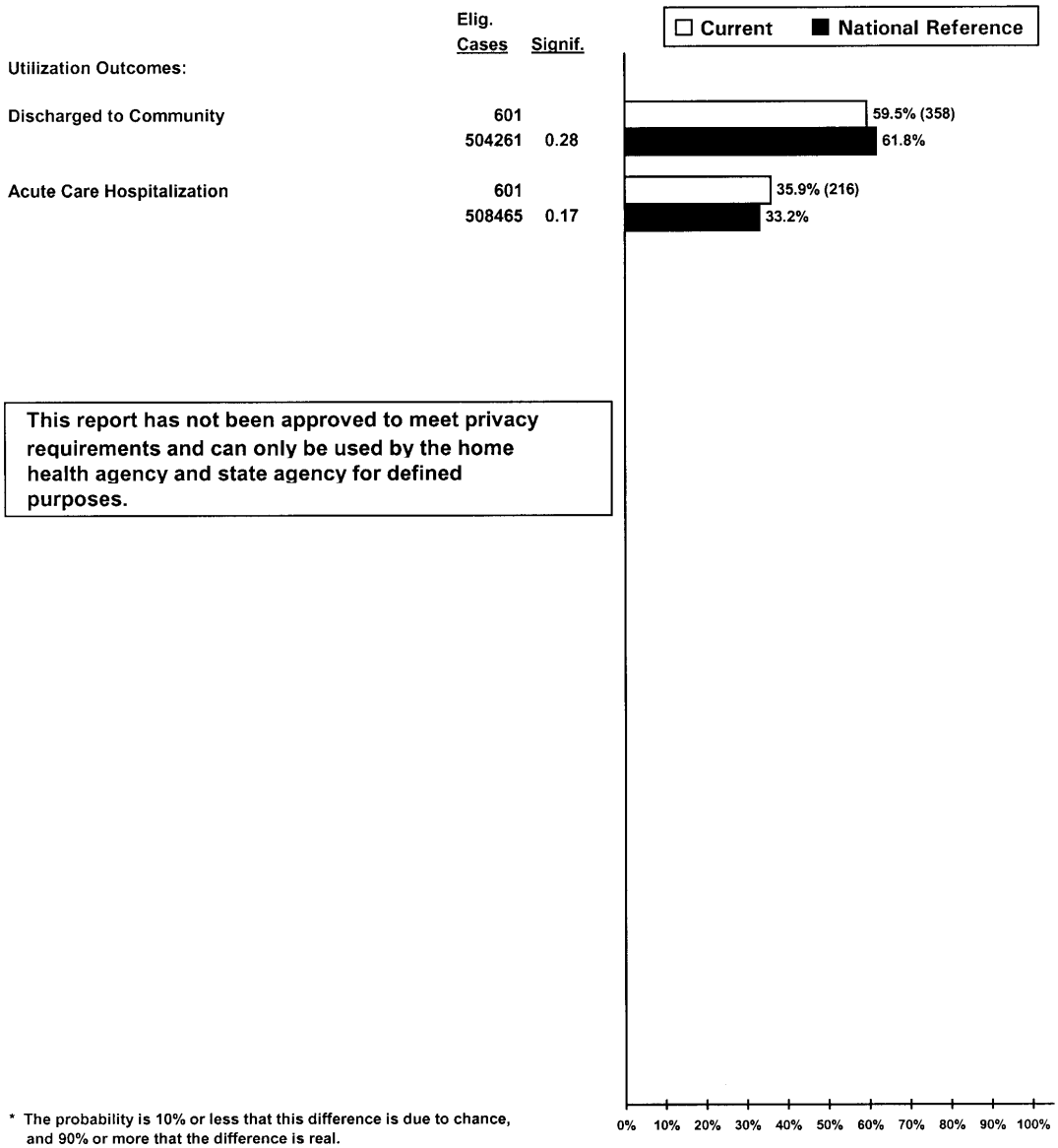
* The probability is 10% or less that this difference is due to chance, and 90% or more that the difference is real.

** The probability is 5% or less that this difference is due to chance, and 95% or more that the difference is real.

Agency Name: FAIRCARE HOME HEALTH SERVICES
Agency ID: HHA01
Location: ANYTOWN, USA
Medicare Number: 007001
Medicaid Number: 999888001

Requested Current Period: 01/2001 - 12/2001
Actual Current Period: 01/2001 - 12/2001
Number of Cases in Current Period: 601
Number of Cases in Natl Ref Sample: 508465
Date Report Printed: 02/28/2002

All Patients' Risk Adjusted Outcome Report



This report has not been approved to meet privacy requirements and can only be used by the home health agency and state agency for defined purposes.

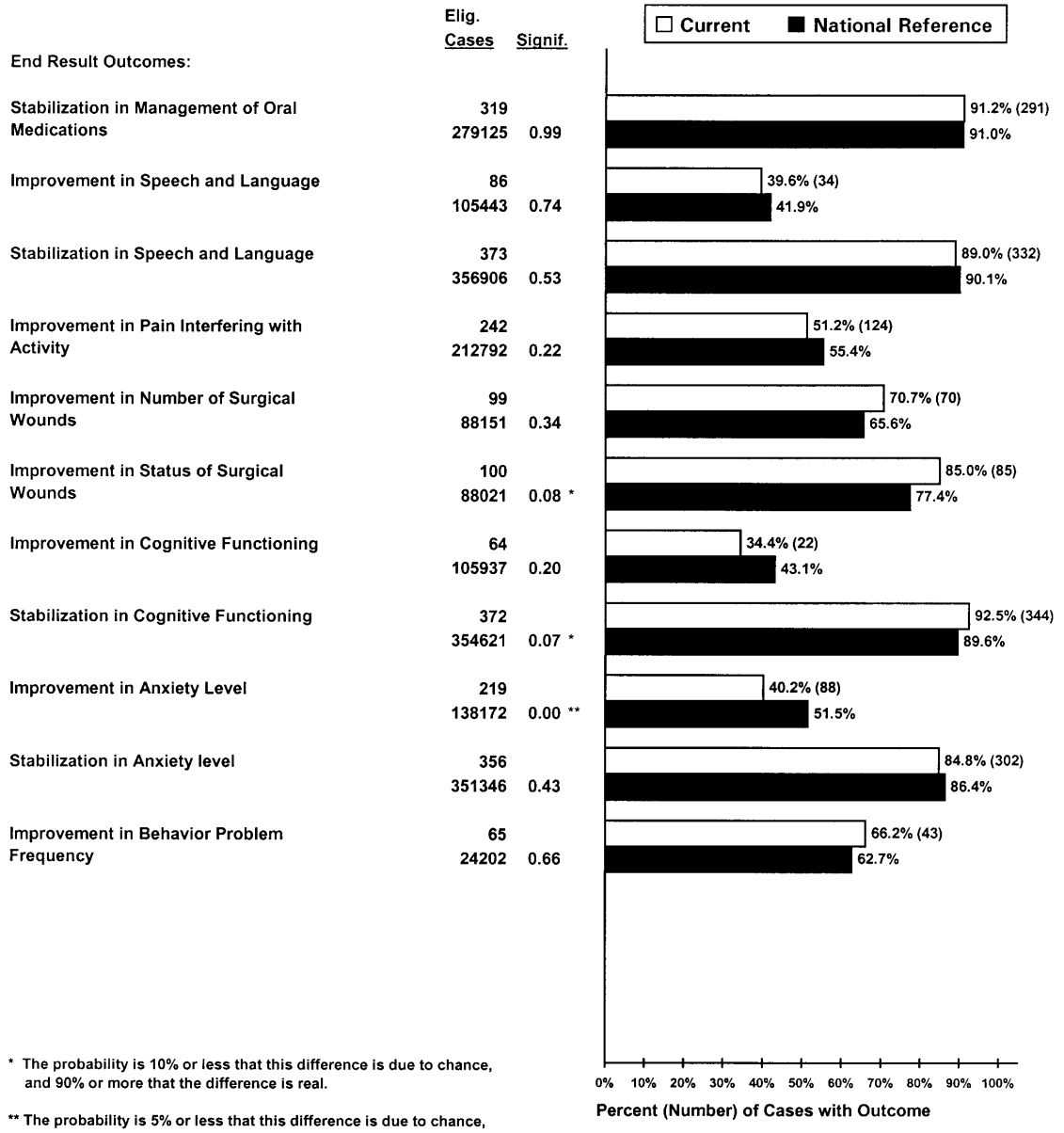
* The probability is 10% or less that this difference is due to chance, and 90% or more that the difference is real.

** The probability is 5% or less that this difference is due to chance, and 95% or more that the difference is real.

Agency Name: FAIRCARE HOME HEALTH SERVICES
Agency ID: HHA01
Location: ANYTOWN, USA
Medicare Number: 007001
Medicaid Number: 999888001

Requested Current Period: 01/2001 - 12/2001
Actual Current Period: 01/2001 - 12/2001
Number of Cases in Current Period: 374
Number of Cases in Natl Ref Sample: 357978
Date Report Printed: 02/28/2002

All Patients' Descriptive Outcome Report



* The probability is 10% or less that this difference is due to chance, and 90% or more that the difference is real.

** The probability is 5% or less that this difference is due to chance, and 95% or more that the difference is real.

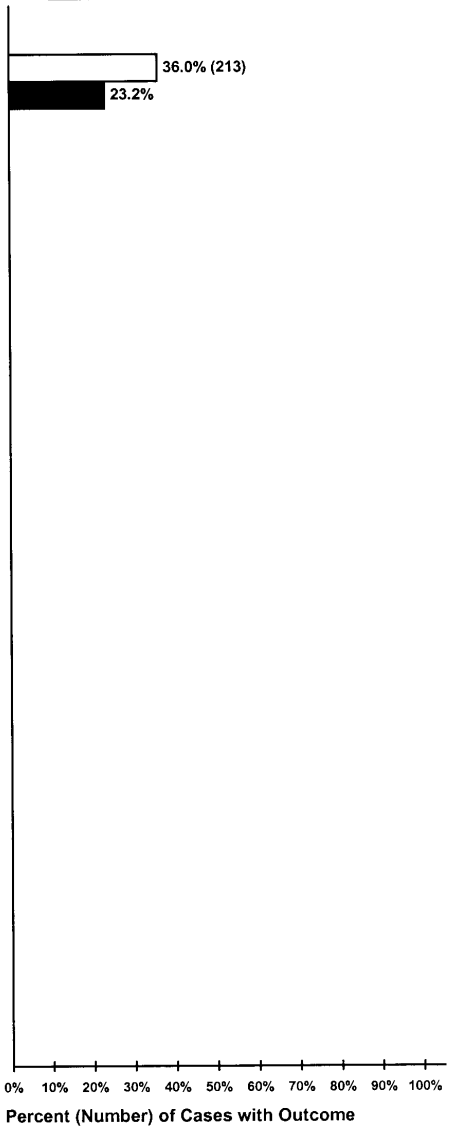
Note: The reference value is not risk adjusted.

Agency Name: FAIRCARE HOME HEALTH SERVICES
Agency ID: HHA01
Location: ANYTOWN, USA
Medicare Number: 007001
Medicaid Number: 999888001

Requested Current Period: 01/2001 - 12/2001
Actual Current Period: 01/2001 - 12/2001
Number of Cases in Current Period: 601
Number of Cases in Natl Ref Sample: 508465
Date Report Printed: 02/28/2002

All Patients' Descriptive Outcome Report

	Elig. Cases	Signif.	Current	National Reference
Utilization Outcomes:				
Any Emergent Care Provided	591		36.0% (213)	
	495317	0.00 **		23.2%



This report has not been approved to meet privacy requirements and can only be used by the home health agency and state agency for defined purposes.

* The probability is 10% or less that this difference is due to chance, and 90% or more that the difference is real.

** The probability is 5% or less that this difference is due to chance, and 95% or more that the difference is real.

Note: The reference value is not risk adjusted.

ATTACHMENT B TO CHAPTER 3

EXERCISES IN INTERPRETING OUTCOME REPORTS

EXERCISE 1: Interpreting Outcome Reports

Directions: Using the sample *All Patients' Outcome Report* for Faircare Home Health Services found in Attachment A, answer the following questions.

Locate the end result outcomes in the risk-adjusted and descriptive report sections:

1. Which end result outcome has the largest sample size of Faircare's patients? _____

2. Which end result outcome has the smallest sample size of Faircare's patients? _____

Locate the utilization outcomes in the risk-adjusted and descriptive report:

3. One utilization outcome is statistically significant. Is this outcome favorable or unfavorable for Faircare compared to the reference? _____

4. Why is the number of cases different for the utilization outcomes (on the last page of each report) compared to the outcomes on the first page? _____

Review all outcomes:

5. How many total outcomes (in both report sections combined) for Faircare are statistically significant and favorable? _____

6. How many total outcomes (in both report sections combined) for Faircare are statistically significant and unfavorable? _____

EXERCISE 1 *(RESPONSES)*

1. Stabilization in Speech or Language (in the descriptive section), which was computed for 373 patients.

2. Improvement in Bowel Incontinence (in the risk-adjusted section), which was computed for 23 patients.

3. Any Emergent Care Provided (in the descriptive section) is unfavorable to (higher than) the reference.

4. The utilization outcomes were computed for the entire sample of patients, while the end result outcomes were computed only for those patients not discharged to an inpatient facility.

5. Five outcomes (Improvement in Transferring, Improvement in Ambulation/ Locomotion, Improvement in Phone Use, Stabilization in Cognitive Functioning, Improvement in Status of Surgical Wounds) are statistically significant and favorable. The first three are included in the risk-adjusted section; the last two are found in the descriptive section of the report.

6. Ten outcomes (Stabilization in Grooming, Improvement in Light Meal Preparation, Stabilization in Light Meal Preparation, Improvement in Laundry, Stabilization in Laundry, Improvement in Housekeeping, Improvement in Shopping, Improvement in Dyspnea, Improvement in Anxiety Level, Any Emergent Care) are statistically significant and unfavorable. The first eight are found in the risk-adjusted section; the last two are included in the descriptive section of the report.

If you have questions or are puzzled, review Chapter 3.

EXERCISE 2: Interpreting Outcome Reports

Directions: Using the sample *All Patients' Outcome Report* for Faircare Home Health Services found in Attachment A, answer the following questions.

1. What is the current reporting period? _____ to _____

Looking at the bar graphs:

2. What data collection period does the white bar refer to? _____ to _____

3. What does the black bar compare the agency to? _____

Identify an **improvement** outcome measure:

4. What is the number of cases included for the current period? _____

5. What is the reference number of cases for this measure? _____

6. What is the statistical significance level (%) for the current vs. reference comparison? _____

7. Based on the statistical significance level (%), should you concentrate on this outcome? Why or why not?

Next, identify a **stabilization** outcome measure:

8. What is the number of cases included for the current period? _____

9. What is the reference number of cases for this measure? _____

10. What is the statistical significance level (%) for the current vs. reference comparison?

11. Based on the statistical significance level (%), should you concentrate on this outcome? Why or why not?

Next, identify a **utilization** measure:

12. What is the number of cases included in the current period? _____

13. What is the reference number of cases for this measure? _____

14. What is the statistical significance level (%) for the current vs. reference comparison? _____

15. Based on statistical significance level (%), should you concentrate on this outcome? Why or why not?

EXERCISE 2 *(RESPONSES)*

1. The current reporting period is 01/2001-12/2001.
2. The white bar refers to Faircare's current data collection period (01/2001-12/2001).
3. The black bar compares Faircare to the national reference sample, which consists of randomly selected patient data from all OASIS data in the national repository.

(For questions 4-7, exact responses will depend on which improvement measure is chosen. For illustrative purposes, Improvement in Bathing will be used.)

4. The current period has 262 cases for Improvement in Bathing.
5. There were 293,613 reference cases.
6. The statistical significance level between current and reference samples is 23% (0.23).
7. Because the statistical significance level is higher than 10% (0.10), this is not a good outcome on which to focus.

(For questions 8-11, exact responses will depend on which stabilization measure is chosen. For illustrative purposes, Stabilization in Laundry will be used.)

8. The current period has 124 cases for Stabilization in Laundry.
9. There were 107,701 reference cases.
10. The statistical significance level between current and reference samples is 0% (0.00).
11. Because the statistical significance level is lower than 10% and is extremely low (0.00), this would be a good outcome on which to focus.

(For questions 12-15, exact responses will depend on which utilization measure is chosen. For illustrative purposes, Discharged to Community will be used.)

12. The current period has 601 cases for Discharged to Community.
13. There were 504,261 reference cases.
14. The statistical significance level between current and reference cases is 28% (0.28).
15. Because the statistical significance level is higher than 10% (0.10), this is not a good outcome on which to focus.

If you have questions or are puzzled, review Chapter 3.

ATTACHMENT C TO CHAPTER 3

OVERVIEW OF RISK ADJUSTMENT METHODOLOGY USED FOR HOME HEALTH AGENCY OBQI REPORTS

1. WHAT RISK ADJUSTMENT IS AND WHY IT IS NEEDED

Outcome analysis is one of the fundamental building blocks of outcome-based quality improvement (OBQI). It involves comparing outcomes of patients discharged from an individual home health agency (e.g., Agency A) with the outcomes of home health patients throughout the United States. The basic purpose of risk adjustment is to ensure a fair comparison by taking into consideration patient characteristics at admission that may affect the likelihood of specific outcomes during a home health episode of care.

For example, suppose the hospitalization rate is 40% for Home Health Agency A, but the national average is 30%. Based on these statistics alone, one might conclude that Agency A provides inferior care, because a much higher proportion of its patients requires hospitalization. However, suppose the average age of patients at Agency A is 15 years older than the national average and the agency has a higher proportion of patients with cognitive impairment than the national average. In this instance, it is understandable or expected that Agency A's hospitalization rate would be higher since the characteristics of its patients at admission (i.e., the *patient case mix)* is very different from that of the national home health patient population.

The various characteristics or conditions of patients, existing at admission, that increase or decrease the likelihood of hospitalization, are termed *risk factors* for hospitalization. *Risk adjustment* is a method of compensating for differences in patient risk factors between two samples or groups of patients. In this example, using risk adjustment helps to ensure that the comparison of hospitalization rates between Agency A and a national reference group is meaningful, despite differences in patient case mix.

It is possible to enumerate a large number of risk factors that *might* influence a given outcome. For instance, there are 149 patient characteristics, or risk factors, derived from OASIS items, which have been found to have some influence on one or more patient outcome measures. However, many of these risk factors may not have a clinically and statistically meaningful influence on a particular outcome. The key to risk adjustment is to find those risk factors that can be empirically determined to exert the most influence on a particular outcome for most patients. In general, risk factors for an outcome are chosen first by conceptually and clinically selecting factors that appear to influence the outcome. These selected factors are then assessed empirically to determine whether their presence or absence has a substantial affect on that outcome.

Typically, a limited number of risk factors (from 10 to 40) have been found to exert a meaningful influence on each of the OASIS-derived outcomes used in outcome analysis for outcome-based quality improvement (OBQI).

2. RISK ADJUSTMENT METHODOLOGY

For purposes of discussion, assume that the outcomes of patients discharged from Home Health Agency A are to be compared with the outcomes of patients from all home health agencies throughout the United States. In this case, we will refer to the patients from Home Health Agency A as the *test group* and those from the nation as the *reference* or *comparison group*. The comparison group can be a sample selected from the nation's home care patients for a given time interval (e.g., a year), or it can consist of the entire population of home care patients for that time interval.

One method of risk adjustment is to produce a *predicted value* for each outcome based on an analysis of the empirical relationships between that outcome and its risk factors in a reference group sample of home health patients. For example, by statistically analyzing the relationship between a series of risk factors and the outcome, *improvement in bathing,* in a national reference group of patients, one can develop a formula expressing the probability of this outcome as a mathematical function of the most relevant risk factors. Using this formula for each of Agency A's patients, it is possible to estimate the expected value for Agency A's outcome rate for all its patients who were disabled/dependent at the beginning of their care[1]. If the actual outcome rate for Agency A's patients is higher than the expected outcome rate for Agency A, then Agency A would be considered above average on this particular outcome. Conversely, if it were lower, then Agency A would be considered below average for this outcome. Furthermore, it is possible to quantify the magnitude of the *expected versus observed* difference and compute statistical significance, i.e., the probability that a difference of a particular magnitude could occur by chance alone.

There are a variety of ways to estimate a statistical model that can be used to calculate a predicted outcome as a function of multiple risk factors. Several alternative methods were tested in the research work leading to the development of OASIS OBQI reports. The methodology ultimately selected for the demonstration program and national implementation of OBQI reporting is logistic regression. Logistic regression is a statistical technique commonly used to analyze the relationship between multiple predictors (e.g., risk factors) and a

[1] Certain patients are excluded from the calculation of specific outcomes. For example, *improvement in bathing* is only defined for patients who were disabled/dependent in bathing at the start of the care episode. Therefore, the expected outcome rate is calculated including only those patients to whom that specific outcome measure applies.

dichotomous (yes/no) outcome (e.g., improved/not-improved). Using this technique, a prediction model was constructed for each outcome based on an analysis of risk factors and outcomes using reference group data. The prediction model is a mathematical formula which reflects the empirical influence of multiple risk factors on a particular outcome.

Risk model development is a repetitive process involving the selection of risk factors according to statistical and clinical criteria reflecting their importance or meaningfulness in predicting an outcome. For each outcome, the risk factors estimated to have the most influence are identified and assessed empirically for inclusion in the prediction model. A prediction model for each outcome is developed based on a combination of risk factors determined to be both clinically and statistically relevant for that outcome. Once developed, the predictive power of each model is tested by applying it to one or more validation samples, consisting of cases set aside from the original sample used to develop the risk models. For the validation sample(s), the proportion of variance explained by the prediction model is calculated, to assess the relative predictive power of the risk adjustment model[2].

The risk adjustment models derived from this process are then used to calculate predicted values for each patient for all outcome measures, from which expected outcome rates for each home health agency are calculated. The annual risk-adjusted outcome report presents a graphical comparison of each agency's actual or observed outcome rate with its expected outcome rate, for each of 29 outcomes. This risk adjustment methodology also allows an agency to compare outcomes for the current year with outcomes for the prior year, adjusting for changes in agency patient mix.

The methodology described above has been used to generate risk-adjusted outcome reports for OBQI demonstration agencies for several years and to produce risk-adjusted outcome reports for home health agencies participating in the PRO OBQI pilot project. The same methodology, with updated risk adjustment models, has been incorporated in the national system to produce OBQI reports for all home health agencies using data from the OASIS national repository.

3. RISK FACTORS INCLUDED IN MODEL DEVELOPMENT PROCESS

The measures that are used as potential risk factors in the risk adjustment process are derived from OASIS data items, including factors such as age,

[2] The proportion of variance explained is given by the squared correlation between the predicted outcome probability derived from the prediction model and the actual outcome observed, using all cases in the sample for which the outcome measure is defined.

patient living situation, diagnoses, wounds, dyspnea, urinary incontinence, sensory impairments, dependence in bathing, pain, etc. The risk factors are based on the start or resumption of care assessment and therefore represent baseline patient status for the episode of care. Many of these risk factors also appear in the Case Mix Report provided to home health agencies. A total of 149 risk factors are considered as candidates for inclusion in each outcome measure's risk model. As indicated above, the specific risk factors that are used for risk adjustment of a particular outcome measure are selected from this large pool of potential risk factors based on clinical meaningfulness and importance as well as statistical effectiveness. Therefore, the number and type of risk factors included in risk adjustment models will differ from outcome to outcome.

4. CONTINUED REFINEMENT OF RISK ADJUSTMENT

The risk adjustment methodology used to generate OASIS outcome reports will be continually reviewed and refined. The risk adjustment models are expected to be re-estimated at least yearly to ensure that they continue to accurately reflect any changes or new factors, which may be found to influence patient outcomes. The large number of cases in the OASIS national repository makes it possible to explore more extensive risk adjustment approaches (in terms of numbers of risk factors) and more complex logistic regression models (in terms of functional form), which may lead to predicting outcomes more accurately. As the OASIS data set is revised and re-tested for validity, risk adjustment methods will also be revised and refined. Alternative risk adjustment methodologies will be studied and tested, with the goal of developing effective risk adjustment approaches that are easily understood by the general public.

ATTACHMENT D TO CHAPTER 3

AGENCY STRATEGIES TO FACILITATE INTERPRETING OUTCOME REPORTS

1. The group responsible for reviewing and interpreting the outcome reports should be selected in advance of the reports' availability.

2. The review group will proceed much more efficiently in interpreting the outcome reports if they have had some training and practice before the report is received.

3. Training should include a discussion of definitions of key terms and concepts used in the outcome reports. It will be beneficial to spend adequate time identifying the different exclusions for "improvement" versus "stabilization" outcomes and the definitions of statistical significance and risk adjustment.

4. Before conducting practice reviews of sample reports, carefully go through the guidelines for reading the reports, identifying the meaning of each component of the report. (If the agency has done this in the past, as when case mix and adverse event reports were received, this process will seem less foreign to them now.)

5. Practice reviews will acquaint the group with any new terminology and will help prepare them for the emotional responses they (and staff members) are likely to experience when their own outcome report is received.

6. Review group members will likely need to remind each other frequently that most outcomes have been risk adjusted, so differences cannot just be "explained away" as being due to differences between the agency's patients and the reference group.

7. It is important for this group to spend some time determining how to prepare the agency staff for receipt of the outcome reports.

    - When should the first training for staff be conducted?

    - Should presentations occur at smaller meetings or in "all staff" meetings?

    - Should the full report be presented immediately when it becomes available or after target outcomes have been selected and can be reported?

    - Exactly what information should be presented?

- Who should do the presentations?
- What staff reactions are likely to occur? How should these be handled in a positive, productive way?
- What instructional methods will be used for the presentation (e.g., sample reports, audio-visuals, etc.)?